

REMARKS

Claims 1-6, 10-12, 14, 21-25, 30, and 31 are pending in this application. Claims 8, 9, 13, 27, and 28 are withdrawn. Claims 7, 15-20, 26 and 29 are canceled. Claims 32-37 are new to this application. Claims 1 and 23 are the pending independent claims.

The independent claims have been amended to state that the metallic insert includes a cavity which receives the target fluid and the cavity further comprises an inlet and an outlet which provide inflow and outflow of the target material. Support for this amendment can be found, for example, at paragraph [0059] of the published application.

The independent claims have also been amended to state that the inlet and outlet provide an essentially turbulent vortex in the flow of the target fluid inside the cavity. Support for this amendment can be found, for example, at paragraphs [0072] and [0073] of the published application.

Claim 23 has been further amended to include the limitation of now canceled claim 29.

None of the references cited by the Examiner teach or suggest an irradiation cell comprising a metallic insert which includes a cavity which receives the target fluid and an inlet and an outlet which permits inflow and outflow of the target material, wherein the inlet and outlet provide an essentially turbulent vortex in the flow of the target fluid inside the cavity as now claimed in the independent claims.

Objections to Drawings

The Examiner has objected that the helium-based cooling device of claim 15 is not depicted in the drawings. Claim 15 is canceled herein.

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Rejections under 35 U.S.C. § 112

Claims 23-26 and 29-31 stand rejected under 35 U.S.C. § 112, second paragraph, as indefinite. Specifically, the Examiner has objected to the limitation "lateral wall, second wall portion and irradiation window" in claim 23. The claims have been amended to remove the objected terminology.

Rejections under 35 U.S.C. § 102

Claims 1-7, 21, and 22 stand rejected under 35 U.S.C. § 102(b) as anticipated by any one of Kiselev et al. (U.S. Patent No. 6,567,492) or Stanton (U.S. Patent No. 3,349,001), or Amini (U.S. Patent No. 6,917,044) or under 35 U.S.C. § 102(a) as anticipated by Wieland et al. (U.S. Patent No. 7,200,198). Claims 10-12, 14, 23-26, and 29-31 stand rejected under 35 U.S.C. § 102(b) as anticipated by Amini.

The claimed device uses a target where the target is recirculated through the system. The configuration of the inlet and outlet provides the vortex in the flow of the target fluid. Such a vortex prevents the generation of stagnation areas in the cavity. None of the cited references teach or suggest configuring the inlet and outlet so as to provide an essentially turbulent vortex in the flow of the target fluid inside the cavity. The claimed device makes it possible to irradiate a target at a much higher current than previously possible with the devices of the prior art.

Kiselev et al.

Kiselev et al. describes an apparatus having a recirculation loop. Kiselev et al.'s recirculating target is moved slowly through the system (Kiselev et al. states that circulation is at the rate of only about 5 ml/min). (Col. 4, lines 61-62.). Kiselev et al. moves the target slowly through the loop in order to periodically extract the produced 18-F. In contrast, the claimed device includes a pump to move the target material

within the circulation circuit at a flow rate effective to allow heat exchange with the external heat exchanger such that the target fluid is essentially in the liquid state during irradiation.

Of further importance, the inlet and outlet of the cavity as claimed in the pending application are configured and arranged to provide an essentially turbulent vortex in the flow of the target fluid inside the cavity. Kiselev et al. does not teach or suggest providing the inlet and outlet in a configuration that provides an essentially turbulent vortex in the flow of the target fluid inside the cavity.

Stanton

Stanton describes a target assembly for a molten metal proton target. Stanton's assembly produces a large quantity of heat (Col. 2, lines 33-35), presumably in order to keep the metal in molten form.

While the molten metal of Stanton passes through the assembly, Stanton does not teach or suggest that an inlet and an outlet are configured and arranged to provide an essentially turbulent vortex in the cavity.

Amini

The target system described by Amini differs from the claimed device in at least four ways, which will be described in more detail below.

First, the target described by Amini is not a recirculating target. As stated by Amini at Col. 1, lines 21-25, the material sample to be irradiated is "confined in the target body." The pending claims require a "circulation circuit" where the target fluid is circulated inside the circulation circuit. The pending claims further require a pump effective for generating flow of the target fluid and circulating the target fluid inside the circulation circuit. As Amini's system is not a recirculating system, Amini does

not teach or suggest a pump effective for generating flow of the target fluid and circulating the target fluid as claimed.

Second, Amini does not teach or suggest a cavity with an inlet and outlet configured to create an essentially turbulent vortex in the flow of the target fluid inside the cavity. Instead, Amini's device includes two-way valves 21, three-way valves 20, and check-valve 18 for loading and unloading the samples after irradiation. The target is injected into the cavity prior to bombardment and then unloaded using Helium as a push gas. Amini does not teach or suggest any "flow" of the target into and out of the cavity, nor that such flow is an essentially turbulent vortex inside the cavity.

Third, Amini further does not teach or suggest a pump and external heat exchanger effective for cooling the target fluid and configured to retain the target fluid in the cavity during irradiation essentially in the liquid state. As already stated, Amini's system is not a recirculating system, and therefore has no need for a pump effective for generating flow of the target fluid and circulating the target fluid as claimed. Moreover, Amini does not seek to maintain the target fluid in essentially the liquid state. Instead, Amini uses heaters to heat the target in order to convert the water into a saturated steam. (Col. 7, lines 36-41.) At the end of bombardment, the heater is turned off and the target is cooled to reach room temperature and ^{18}F in aqueous phase is unloaded using Helium as the push gas.

Fourth, Amini does not teach or suggest that an inlet and an outlet are configured and arranged to provide an essentially turbulent vortex in the flow of the target fluid inside the cavity.

Therefore, the claims are both novel and inventive over Amini.

Wieland et al.

Just as previously described in respect to the other cited references, Wieland et al. does not teach or suggest placement of an inlet and an outlet in a cavity such that the inlet and outlet are configured and arranged to provide an essentially turbulent vortex in the flow of the target fluid inside the cavity. The turbulent flow vortex of the claimed invention is important to prevent areas of stagnation inside the cavity and having the effect to cool the target window.

Rejections under 35 U.S.C. § 103(a)

Claims 1-7, 10-12, 21-26, and 29-31 stand rejected as unpatentable over Shaeffer et al. (ORNL/MIT-258) in view of Amini.

Shaeffer et al. does not cure the deficiencies of Amini as described above. Specifically, Shaeffer et al. does not describe the placement of the inlet and outlet of the cavity such that the inlet and outlet are configured and arranged to provide an essentially turbulent vortex in the flow of the target fluid inside the cavity.

Claims 2-7 and 22 stand rejected under 35 U.S.C. § 103(a) as obvious over one of Kiselev et al. or Stanton or Amini or Wieland et al. Claims 24 and 25 stand rejected under 35 U.S.C. § 103(a) as obvious over Amini. Claim 15 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Amini in view of Wieland ("Foil Sealing Assembly used on 11 MeV Proton Targets. Proceedings of the First Workshop on Targetry and Target Chemistry. Heidelberg, Germany, October 1985") (hereinafter "Wieland 1985"). Claim 15 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Shaeffer et al., in view of Amini, and further in view of Wieland 1985. As each of these rejected claims ultimately depends from independent claims 1 or 23, Applicants

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respectfully submit that the dependent claims are patentable for at least the reasons already described above for each of the independent claims.

The Commissioner is hereby authorized to charge any additional fees which may be required with respect to this communication, or credit any overpayment, to Deposit Account No. 06-1135.

Respectfully submitted,

FITCH, EVEN, TABIN & FLANNERY

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